

# SAIP 2011



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## **Inflammatory response of injured diabetic fibroblasts after low intensity laser irradiation at a wavelength of 830 nm**

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### **Content :**

Diabetes mellitus (DM) is a chronic disease characterized by impeded glucose metabolism and preceded by diabetic ulcers which are chronic due to deteriorated healing process. Hypoxia, decreased fibroblast proliferation and impaired growth factors are amongst root factors that contribute to impaired healing. Photostimulation is a non-invasive treatment that utilizes low intensity laser irradiation (LILI) to provide healing or stimulate appropriate cellular functions. Human skin fibroblast cells (WS1) were used in this study that consisted of four groups viz. normal, normal wounded, diabetic wounded and hypoxic, each with a non-irradiated control. Wounding was simulated by creating a central scratch using a pipette. A diabetic state was induced by growing cells in media that contained excess glucose to a final concentration of 22.56 mM, and for hypoxic insult cells were incubated under anaerobic conditions (0% O<sub>2</sub> and 20% CO<sub>2</sub>) for 4 h. Cells were then irradiated at a wavelength of 830 nm with 5 J/cm<sup>2</sup> and incubated for 1 or 24 h. Morphological changes were observed by light microscopy; ELISA and flow cytometry were used to determine interleukin (IL)-1 $\beta$ , IL-6 and tumour necrosis factor (TNF)- $\alpha$  as inflammatory markers; and caspase 3/7 for apoptosis was determined by luminescence. After a 24 h incubation period the wounded area appeared decreased and hypoxic cells had regained normal morphologic features when irradiated, TNF- $\alpha$  and IL-1 $\beta$  had decreased in irradiated samples, whereas IL-6 was increased. Caspase 3/7 had decreased in irradiated samples at both 1 and 24 h. This study demonstrated the beneficial effects of LILI since the results showed significantly reduced inflammatory response in vitro and hastened wound healing particularly under diabetic and hypoxic conditions.

### **Level (Hons, MSc, PhD, other)? :**

DTech

### **Consider for a student award (Yes / No)? :**

yes

### **Short Paper :**

yes

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